

Report for 2004AZ70G: Pharmaceutically Active Compounds: Fate in Sludges and Biosolids Derived from Wastewater Treatment

There are no reported publications resulting from this project.

Report Follows

The two main objectives of this project are to (1) establish reliable measurements for endocrine disrupting compounds (EDCs) as well as several pharmaceutically active compounds (PhACs) in samples derived from sludges/biosolids from selected wastewater treatment plants utilizing different sludge digestion processes and (2) examine the fate of biosolid-associated EDCs and PhACs in soils receiving land application of finished biosolids.

During the first 8 months of this study, the following tasks were performed to satisfy project objectives:

1. A preliminary comparison of sample extraction techniques for methods used at University of Arizona (microwave assisted extraction, MAE) and at USGS (accelerated solvent extraction, ASE) has been performed using samples obtained locally from the Ina Road Wastewater Pollution Control Facility, Tucson, AZ. Sample extracts were analyzed for 21 PhACs and 61 wastewater compounds using liquid chromatography-mass spectroscopy (LC-MS) and gas chromatography-mass spectroscopy (GC-MS) at Edward Furlong's USGS laboratory, Denver, Colorado.
2. As part of the knowledge transfer objective of the project, two PhD students from the environmental engineering program at the University of Arizona (UA) traveled to Edward Furlong's USGS laboratory in December 2004 for a two-week visit to learn the LC-MS and GC-MS analytical techniques used to measure PhACs and EDCs and then apply these methods on the MAE and ASE sample extracts derived from the Ina Rd sludge/biosolid samples.
3. Three 1-m long stainless steel soil columns were set up at UA containing mixtures of locally obtained agricultural soils and biosolids from the Ina Road plant. Two additional columns are being prepared for additional studies. These columns will be irrigated and leachates collected for analysis of EDCs and PhACs. A master's student in the environmental engineering program at UA is performing this work. Soil samples from experimental plots at the University of Arizona's Marana farm have been collected and archived. These plots have received annual applications of biosolids for the past 20 years. Extraction and analysis of these soils will provide information on the long-term fate of EDCs and PhACs originating from biosolid application.
4. Conference calls among project participants were conducted to

Activities Planned for next six months:

1. A second visit to Edward Furlong's USGS laboratory by the two UA PhD students will take place in summer 2005. Activities will include additional comparison of MAE and ASE sample extraction methodologies and extraction/analyses of sludge/biosolid samples obtained from each of the three wastewater treatment plants included in the study. Sampling points will include raw and digested sludges, dewatered sludges, finished biosolids, as well as liquid phase samples of plant influent and effluent to support mass

balance calculations. Collection and analysis of these samples will be repeated at least four times (quarterly) at each plant during the course of the project.

2. Soil column studies will commence. Column leachates will be analyzed for presence of EDCs and PhACs. Samples of column soils will be extracted and analyzed for the same sets of compounds to determine whether compounds degrade or become unavailable over time.